

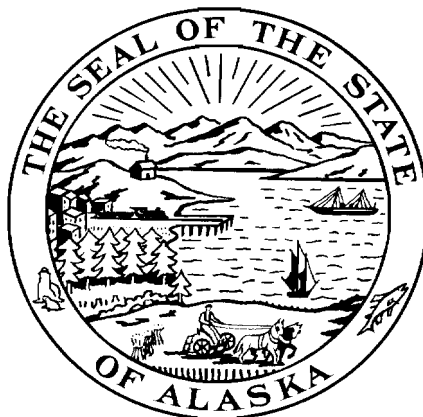
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STATE OF ALASKA

William A. Egan, Governor



ANNUAL REPORT OF PROGRESS, 1965 - 1966

FEDERAL AID IN FISH RESTORATION PROJECT F-5-R-7

SPORT FISH INVESTIGATIONS OF ALASKA

ALASKA DEPARTMENT OF FISH AND GAME  
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## INTRODUCTION

This report of progress consists of Job Segment Reports conducted under the State of Alaska Federal Aid in Fish Restoration Project F-5-R-7, "Sport Fish Investigations of Alaska."

The project during this report period is composed of 18 separate studies. Some are specific to certain areas, species or fisheries, while others deal with a common need for information. Each job has been developed to meet the needs of various aspects of the State's recreational fishery resource. Seven jobs are designed to pursue the cataloging and inventory of the numerous State waters. These jobs, which are of a continuing nature, will eventually index the potential recreational fisheries. Four jobs are directed toward specific sport fish studies. These include specialized efforts toward the anadromous Dolly Varden of Southeastern Alaska, the silver salmon in Resurrection Bay, the king salmon stocks on the Lower Kenai Peninsula, the king salmon stocks in Upper Cook Inlet, and the Arctic grayling of the Tanana River system.

The statewide access program is developing rapidly. Our efforts in investigating existing and potential recreational sites and access has resulted in favorable action being taken on our proposals and recommendations submitted to the land management agencies at both the State and Federal levels.

The remaining jobs included a specialized creel census effort in Southeastern, an egg-take program designed to establish indigenous egg-take sources, and evaluation of the Fire Lake system.

Three special reports have been completed from past studies on the Dolly Varden study. These appear in the Department's "Research Report" series and are a direct result of the Federal Aid In Fish Restoration Program. To date, the following reports have been published: Research Report No. 3, "Some Migratory Habits of the Anadromous Dolly Varden Salvelinus malma (Walbaum) in Southeastern Alaska," 1965, Robert H. Armstrong; Research Report No. 4, "Annotated Bibliography on the Dolly Varden Char," 1965, Robert H. Armstrong; and Research Report No. 5, "Age and Growth of Anadromous Dolly Varden Char Salvelinus malma (Walbaum), in Eva Creek, Baranof Island, Southeastern Alaska," 1966, David W. Heiser.

The material contained in this progress report is often fragmentary in nature. The findings may not be conclusive and the interpretations contained herein are subject to re-evaluation as the work progresses.

## RESEARCH PROJECT SEGMENT

STATE: ALASKA Name: Sport Fish Investigations of Alaska.

Project No.: F-5-R-7 Title: Egg-Take Investigation in Cook Inlet Drainage and Prince William Sound.

Job No.: 7-F

Period Covered: July 1, 1965 to June 30, 1966.

## ABSTRACT

An experimental silver salmon egg-take was again conducted at the Swanson River on the Kenai National Moose Range. A total of 2,043 silver salmon, Oncorhynchus kisutch, was enumerated at a temporary weir that operated from August 19 to October 12. An estimated 913,330 eggs were obtained from 227 females. Airport Creek, a tributary to the Swanson River, provided an additional 20,690 eggs. Information is presented on sex composition, length frequency, and time of migration. Age 2.1 silver salmon were dominant in the run.

## RECOMMENDATIONS

1. It is recommended that other streams on the Kenai Peninsula that do not support active sport fisheries be investigated for possible sources of silver salmon eggs.
2. It is recommended that an egg-take again be conducted at the Swanson River, and that the present weir be replaced with a structure that will trap fish during greater flows.

## OBJECTIVES

1. To locate economical and readily accessible sources for procuring salmonoid eggs from Cook Inlet and Prince William Sound drainages.
2. To assess potential egg-take stocks for the following characteristics:
  - a. A race with a lake-rearing background in the life cycle since a majority of the stocking, whether for a resident (land-locked) or an anadromous purpose, will utilize lake rearing.
  - b. Racial characteristics of rapid growth, good condition factor and sporting qualities.

- c. Fish from waters of a type common throughout large portions of the State is also advisable in order to broaden the field of potential use.

#### TECHNIQUES USED

A temporary weir was erected across the Swanson River approximately 20 miles upstream from tide water. The 50-foot diagonal fence included a 3' x 3' x 8' trap located in the angle formed by the upstream end of the weir and the streambank. A detailed description of the weir and its construction has been presented by Lawler (1962).

The trap entrance was three feet wide with a manually operated sliding gate. An insufficient attraction current resulted in prolonged delay to migrating salmon when a simple "V" entrance was installed.

Six 4' x 4' x 8' holding pens were placed in the stream adjacent to the trapping installation. Operational and construction features of the pens are detailed by Engel (1964).

The procedure for taking eggs was as follows: the dorsal artery of the female was severed to permit bleeding, eggs were removed by incision and fertilized by the standard dry method, one male was used for each female. Fertilized eggs were water hardened about one hour in 5-gallon cans before shipment to the Fire Lake Hatchery.

#### FINDINGS

The Swanson River has been investigated as a potential silver salmon egg-take source since 1962. In addition to annual egg-takes, information concerning population size, sex ratios, and migration patterns has been collected to manage these stocks.

The Swanson River weir was operational on August 19 and was maintained daily until dismantled on October 12 because of icing conditions. The first silver salmon was captured on August 20. A total of 2,043 fish was enumerated during the season.

Commencing September 19, the stream exceeded the height of the weir and remained at that level until the structure was removed. Only 40 salmon were trapped during the period of high water. To estimate the number of fish missed, a comparison of past weir counts was made. In 1963 and 1964 the weir counts were 1,198 and 1,185 respectively. During both years over 40 percent of the migration passed the weir after September 19. If the 1965 migration followed a similar pattern an undetected escape-ment of 1,400 fish seems reasonable. Based on this assumption the estimated number of silver salmon passing the weir was approximately 3,400.

The major migration peak occurred between September 6 and September 12 in conjunction with a rise in water levels. Eighty percent of the weir total was enumerated during this seven-day period.

The sex ratio, as determined by gross appearance, was 1:1.0. This is similar to the 1963 and 1964 male to female sex ratios of 1:1.1 and 1:1.2.

Data concerning sex composition may not be entirely reliable because the early portion of the silver salmon run has never been enumerated and the weir is known to be permeable to small "jack" males. Males have shown a slight tendency to arrive early at the Swanson River.

To permit adequate escapement for various stocks within the system, females were removed in proportion to the daily weir catch. Table 1 shows the daily disposition of the catch. Practically all fish were "green" on arrival and had to be held two to three weeks before they ripened. Early arrivals generally required the greatest holding time.

A holding loss of 5.9 percent was an improvement over past years when mortalities ranged from 11.8 to 27.0 percent. Mortality during the retention period has been minimized by selecting fish close to maturation, reducing crowding, and improved holding pen design.

Spawn was taken between September 27 and October 11. A total of 227 females was spawned, yielding an estimated 913,330 eggs with an average of 4,023 eggs per fish. This represents a 27.2 percent increase over the mean fecundity for the past 3 years (Table 2).

Fork lengths of spawned females ranged from 55.5 cm to 68.5 cm with a mean of 61.6 cm. This is comparable to 1964 when females averaged 62.4 cm. The length frequency distribution is presented in Figure 1.

Scale readings from 57 silver salmon revealed 2.1 as the dominant age group. One fish was 1.1. Age 2.1 refers to a silver salmon that migrated to sea in its third year and returned as an adult in its fourth year. These data should be viewed with some caution, however, because the scales were not collected randomly throughout the run. Precocious males were also present in the spawning migration, but age data were not collected because of the weir design.

Water temperatures at the weir ranged from a high of 54°F. to a low of 32°F. The stream began to freeze over on October 15. Mean daily water temperatures for 1963-1965 are presented in Figure 2. These data show a significant correlation between water temperature and silver salmon egg development. In 1963 and 1965 the first spawn was taken on September 26 and 27 at water temperatures of 46°F. and 49°F., respectively. During 1964 colder water temperatures prevailed throughout the ripening period and the first spawn was taken on October 5 at a water temperature of 41°F. Spawn has been taken at water temperatures as low as 33°F.

The water level at the weir usually ranged between 20 and 26 inches but during high water rose to over 40 inches.

Airport Creek, which enters the Swanson River approximately two miles above the weir, was also explored as a possible source of silver salmon eggs. This stock of fish passed upstream before the Swanson River weir was erected. Spawning activity was first observed on September 6 and subsequent foot furveys during the peak of spawning revealed a minimum of 250 silver salmon. On September 21 an egg-take was attempted by dip-netting fish directly from spawning redds. Nearly all captured females were either green or spent. Nine females were spawned yielding an estimated 20,690 eggs.

TABLE 1 - Daily Disposition of Silver Salmon Captured at the Swanson River Weir, 1965.

Date	Daily Weir Catch	Released Above Weir		Held for Spawn	
		Males	Females	Males	Females
Aug. 19	-	-	-	-	-
20	4	3	1	-	-
21	7	5	2	-	-
22	2	2	0	-	-
23	14	11	3	-	-
24	16	11	5	-	-
25	12	7	5	-	-
26	32	20	12	-	-
27	17	11	6	-	-
28	12	6	6	-	-
29	6	4	2	-	-
30	1	1	0	-	-
31	19	7	9	-	3
Sept. 1	4	2	1	-	1
2	5	3	2	-	-
3	3	1	2	-	-
4	5	1	4	-	-
5	5	2	1	-	2
6	99	55	21	-	23
7	249	133	82	-	34
8	72	24	33	-	15
9	709	335	305	-	69
10	205	116	52	-	37
11	158	63	76	-	19
12	155	86	58	-	11
13	35	19	8	1	7
14	0	-	-	-	-
15	6	-	2	1	3
16	35	1	10	16	8
17	4	1	-	1	2
18	105	12	26	42	25
19	7	1	2	1	3
20	5	-	3	2	0
21	6	-	1	2	3
22	7	-	2	4	1
23	17	3	8	2	4
24	5	1	1	3	0
25	-	-	-	-	-
26	-	-	-	-	-
27	-	-	-	-	-
28	-	-	-	-	-
29	-	-	-	-	-
30	-	-	-	-	-

TABLE 1 (Cont.) - Daily Disposition of Silver Salmon Captured at the Swanson River Weir, 1965.

<u>Date</u>	<u>Daily Weir Catch</u>	<u>Released Above Weir</u>		<u>Held for Spawn</u>	
		<u>Males</u>	<u>Females</u>	<u>Males</u>	<u>Females</u>
Oct. 1	-	-	-	-	-
2	-	-	-	-	-
3	-	-	-	-	-
4	-	-	-	-	-
5	-	-	-	-	-
6	-	-	-	-	-
7	-	-	-	-	-
8	-	-	-	-	-
9	-	-	-	-	-
10	-	-	-	-	-
11	-	-	-	-	-
12	-	-	-	-	-
TOTAL	<u>2,043</u>	<u>947</u>	<u>751</u>	<u>75</u>	<u>270*</u>

\* Twenty-four females were lost when a pen overturned.

TABLE 2 - Average Fecundities of Silver Salmon at the Swanson River, 1962-65.

<u>Year</u>	<u>Females Spawned</u>	<u>Estimated Eggs Taken</u>	<u>Average Fecundities*</u>
1962	97	305,900	3,154
1963	308	970,000	3,149
1964	255	812,300	3,186
1965	227	913,330	4,023

\* Determined by dividing the number of eggs taken by the number of females spawned.

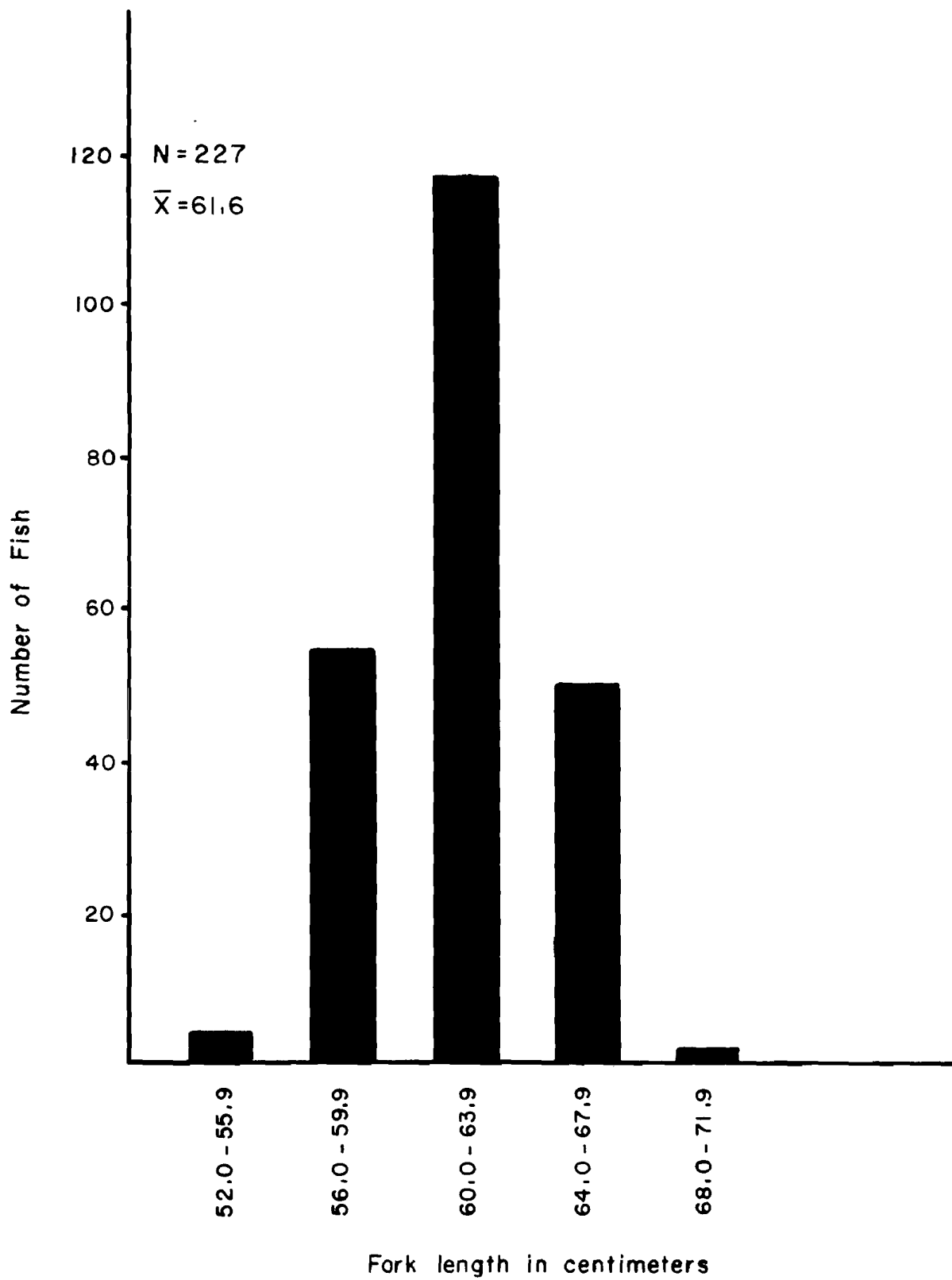


Figure 1. Length frequency of female silver salmon spawned at the Swanson River, 1965.



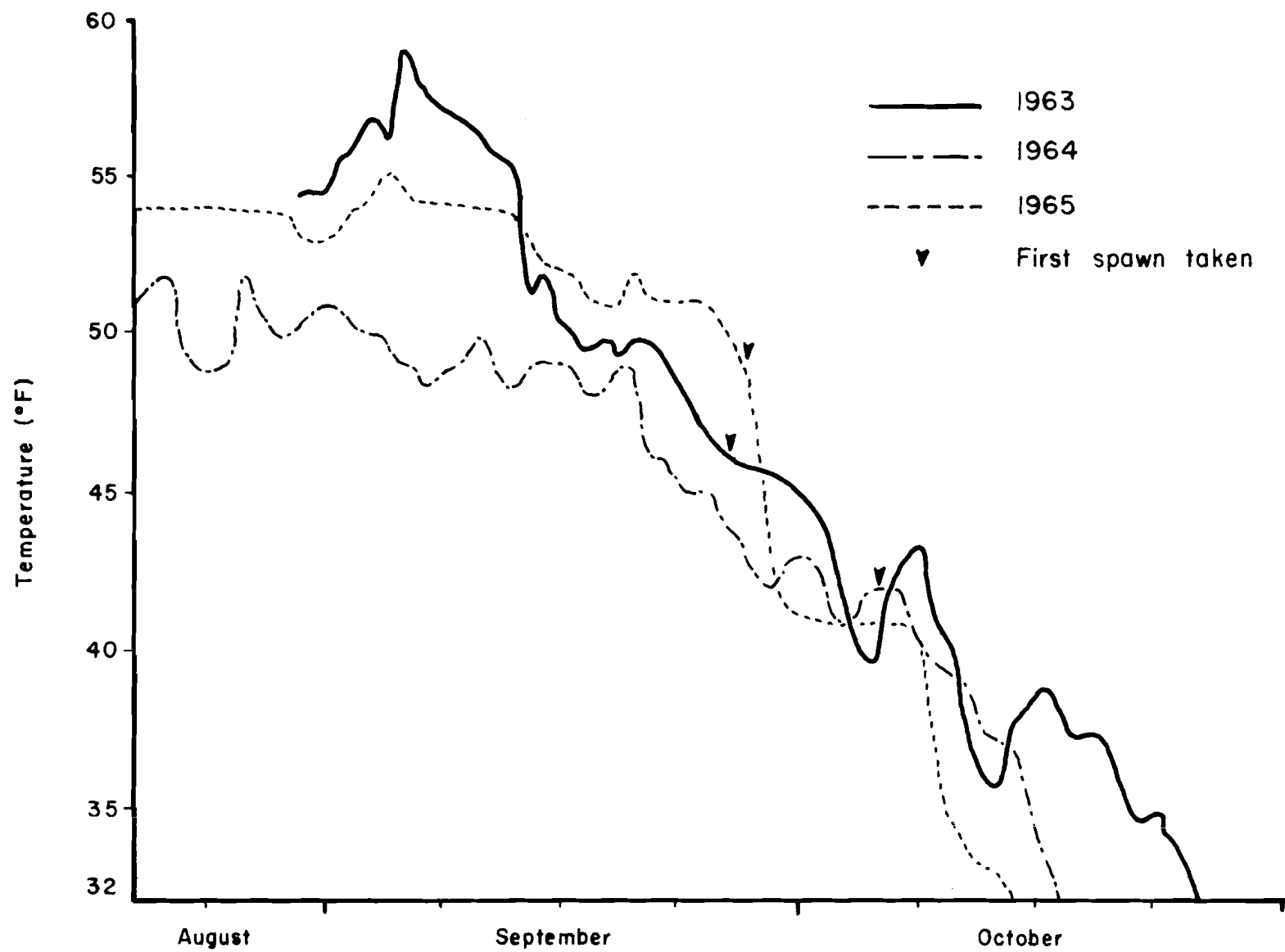


Figure 2. Daily water temperatures at the Swanson River weir and dates of first spawn take 1963-1965.

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